

# Technology Development

## Overview

There are always opportunities to improve upon current technology by making it safer, more efficient or more cost-effective, while meeting the ever-changing needs of environmental management. The Technology Division at the U.S. Department of Energy Nevada Operations Office (DOE/NV) tackles these opportunities by seeking and utilizing the newest, most innovative technologies to facilitate the Environmental Management Program's ability to accomplish its goals.

The Technology Division consists of two teams: the *National Programs Team*, which focuses on the investigation of technologies that affect activities across the DOE Complex; and the *Nevada Programs Team*, which targets technologies that address environmental remediation and site monitoring needs in Nevada. While most activities undertaken by these teams support DOE's Environmental Management Program, some efforts are designed to support other DOE program initiatives.

### **The Characterization, Monitoring, and Sensor Technology Crosscut Program**

The Characterization, Monitoring, and Sensor Technology Crosscut Program focuses on developing improved sensors to meet DOE needs nationwide for characterization and monitoring of sites with environmental contamination. This activity supports the national Office

of Science and Technology efforts in five research focus areas – subsurface contaminants, mixed waste, facility deactivation and decommissioning, tank closures, and nuclear materials.

Another responsibility is coordinating, developing, and evaluating new and existing remote sensing technologies that can be applied to environmental restoration and waste management activities. Remote sensing involves using technology such as robotics and computers to accomplish a task from a distance. This significantly reduces risk of human exposure to radiation and cuts costs by enabling instruments to quickly and efficiently maneuver in areas that are difficult for humans to physically reach. The development of real-time data analysis sensors is one example of this type of technology successfully improving underground monitoring during drilling operations.

One of the technologies developed under this program is the Laser-Induced Fluorescence Imaging System, which detects contamination over large areas. One of the many uses for this technology is the detection of uranium contamination on any surface by illuminating the material and then detecting the signature emitted by the contaminant.

### **The Site Technology Coordination Group**

The Site Technology Coordination Group facilitates demonstrating or deploying innovative technologies. Specific responsibilities include: identifying and consolidating DOE/NV Environmental Management technology needs; communicating these needs and their priorities to DOE Headquarters, other governmental agencies, the private sector, stakeholders, and academia; facilitating the partnering and leveraging of resources; implementing technologies to expedite and economize Environmental Restoration and Waste Management operations; and sharing lessons learned with other DOE Operations Offices.

The Site Technology Coordination Group also promotes local stakeholder involvement in its Site Technology Coordination Group meetings. This timely exchange of information eliminates the duplication of effort within the DOE Complex, while saving time and money through the expedient completion of environmental restoration work and the reduction of waste volumes.



*Laser-Induced Fluorescence Imaging System*



An example of successful resource pooling involved a DOE Ohio Area Office project. This project proposed the deployment of the Personal Ice Cooling System at the Nevada Test Site (NTS) to meet the need for improved personal protective equipment for working in warm temperature environments. The Personal Ice Cooling System is a self-contained body temperature control system that circulates cool water through tubing that is incorporated into a durable and comfortable garment suit similar to long underwear. It has the potential to improve productivity and comfort by managing heat stress for workers. Ten of these systems have been deployed and are being evaluated at the NTS.



*Personal Ice Cooling System*

unresolved technical needs of DOE/NV's environmental remediation and waste monitoring efforts. Examples of recent Accelerated Site Technology Development projects include the segmented gate process for soil cleanup, laser cutting of oversized transuranic waste packages, the position sensitive radiation monitoring system, and an alternative cover and monitoring system for arid environment landfills.

## **The National Environmental Research Park**

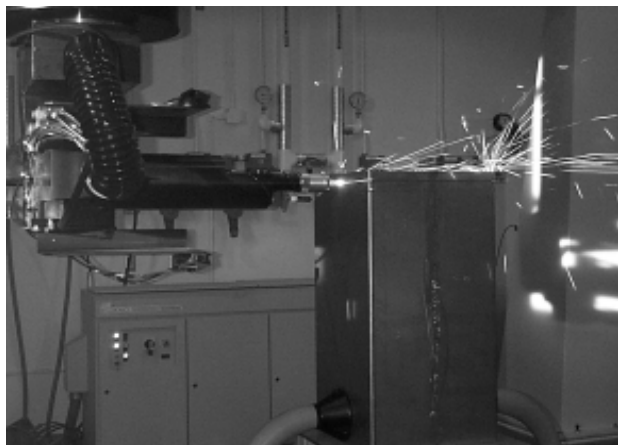
The NTS, which occupies approximately 1,375 square miles, is one of the largest controlled access areas in the United States. Because of its size, remote location, and unique ecological conditions, the site serves as an outdoor laboratory. Through cooperative agreements with the



*A student works with anaerobic cultures  
(microbes being grown without oxygen)*

## **Accelerated Site Technology Deployment Projects**

The Technology Division serves as the mechanism for deploying innovative technologies to meet some of the



*Laser cutting technology*

University of Nevada, Las Vegas and the University of Nevada, Reno, the National Environmental Research Park Program provides professors and graduate students the opportunity to conduct research and receive environmental training at the NTS. Researchers are encouraged to focus their efforts on environmental management technology needs identified through the Site Technology Coordination Group and DOE program managers.



## Risk Policy Initiatives

The DOE/NV Environmental Management Program, through a cooperative agreement with the University of Nevada's Harry Reid Center for Environmental Studies, is the lead technical field site for the Nevada Risk Assessment Management Program. Under this program, scientists and engineers perform independent human health risk assessments of environmental restoration and waste management activities. They ensure that the unique risks associated with the NTS are clearly understood by stakeholders and considered in the formulation of national risk strategies. Currently, the DOE/NV Environmental Management Program is participating in a Center of Excellence risk pilot project that evaluates experiences with risk-based decision-making processes and stakeholder participation and their perception of such processes.

## Marshall Islands

Following World War II through the 1950s, the Marshall Islands were the off-continent site for the United States' nuclear weapons testing program. Atolls such as Bikini and Enewetak became well known in the newsreels of the day for the 66 atmospheric tests conducted there. To allow for testing, some Island populations were relocated. Of those who remained on the Islands, some were inadvertently exposed to fallout from atmospheric tests. Today, DOE/NV is working on

the Marshall Islands Project, which involves fulfilling the U.S. government's obligations under the *Compact of Free Association Act*, to provide health care for the exposed population and assistance to the resettling populations. A contractor to the DOE/NV provides logistical support to facilitate the implementation of two terrestrial science missions and year-round medical surveillance. Support includes: providing the facilities and vessels necessary to conduct the DOE mission and collect samples; providing medical services for patients requiring further care and evaluation; conducting year-round maintenance of the terrestrial science plots and sampling equipment; and coordinating travel.



*Employees collect samples at Bikini Atoll.*

## Renewable Energy Activities

The Technology Division provides federal oversight for renewable energy programs and other research efforts aimed at developing alternate forms and sources of energy production and utilization. These efforts include the Hydrogen Refueling Station in Las Vegas, which provides a pollution-free power source for vehicles, as well as others designed to develop alternatives to traditional power sources that may either be scarce and/or a pollution concern.



*Bikini Field Station*



## Summary

The Technology Division at the DOE Nevada Operations Office brings together a balanced mix of scientists, engineers, and technicians to provide innovative and effective solutions, systems, and services in the development and deployment of new technologies for environmental management. Individual teams and their programs play significant roles in supporting this mission by providing integrated services from concept to implementation.



DOE/NV - - 600  
June 2000

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